Chassis Lubricate for Safety every 1,000 Miles Lubrication

The Institute Spokesman

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*Shock Absorber Service**

MOST NEGLECTED PART OF MOTOR CAR REALLY DESERVES SYSTEMATIC ATTENTION

By E. L. Potter, Houde Engineering Corporation, Buffalo, N. Y.

Few people realize that today's high powered and extremely stable automobiles are equipped with five mechanical engines by the manufacturer. Of these, every one is acquainted with the gasoline engine which provides the motive power for the vehicle, but a very small minority realize that the four shock absorbers are just as truly engines as the engine under the hood. The one operates on the principle of the conversion of heat into energy. The others, by comparison, operate on the principle of the conversion of spring energy into heat. In addition they are further called upon to dissipate the heat thus developed.

Of the small minority who realize that the shock absorbers are truly engines, few are aware of the fact that frequently the shock absorbers are called upon to absorb and dissipate more energy per cubic inch displacement than the engine is capable of producing per cubic inch of its displacement.

In the absorption of this energy, internal operating pressures frequently reach as high as 4,500 pounds per square inch. Is it any wonder then that shock absorbers, subjected as they are to the grime and abrasion of the road wash, frequently lose a portion of their fluid.

To carry our analogy still further—the oil in an automobile engine serves the single purpose of lubrication. Its level is of vital concern to every owner and service man. The fluid in the shock absorber serves the double purpose of lubrication and of operation.

Conscientious owners, aware of their investment, take pains to see that the proper engine oil level is maintained. Service men, aware of the possible consumption and leakage, are ever watchful of this level.

The service man, in helping to protect his customer's investment, thereby gains a profit for himself.

But what of the other engines in which the owner has an investment and the service man a potential source of profit? Truly, the shock absorber is the forgotten part of the automobile!

In the past, shock absorbers have received little or no attention until the car owner was definitely in trouble and beyond the aid of the normal service station. This lack of attention was the direct result of a multiplicity of causes, main among which was the following. It was almost impossible to replenish the fluid in the shock absorber without either having equipment in the form of a special fluid gun or taking the shock absorber completely off of the automobile. In the first instance, service stations did not feel warranted in making the necessary outlays for special fluid guns, etc., and in the second instance, the charge they had to impose upon the car owner for the removal of the shock absorbers for refilling and inspection became so high as to discourage the general acceptance of such service.

If shock absorbers were to receive the periodic inspection and refilling which is normally given to the battery, the crankcase, and the differential, chances are very great indeed that failure would never occur and that the car owner would never have reason for complaint.

Herein lies the possibility of profit to the service station, namely, the maintenance of the fluid level in these four forgotten engines.

Houdaille, realizing this condition, and to aid the service station, has made available a special fluid container in the form of a dispensing tube for refilling Houdaille shock absorbers. This tube eliminates the necessity for special tools and also the need for removing shock absorbers from the car for refilling.

With this tube, it now becomes possible for the average service station which is ade-

(Continued on page 2)

H. F. WILHELM MOVES UP

B. C. VOSHELL TO REPRESENT SOCONY-VACUUM OIL COMPANY, INC. ON N. L. G. I. BOARD

"Mr. H. F. Wilhelm, who has been the representative of the Socony-Vacuum Oil Company, Inc. in the National Lubricating Grease Institute since its organization, has resigned in order to assume new responsibilities in his Company.

Mr. Wilhelm at the same time relinquishes the position of Director. He is succeeded both as his Company's representative and as Director, by Mr. B. C. Voshell, who is manager of the technical Department of the Socony-Vacuum Oil Company, Inc.

Mr. Wilhelm has been promoted to the staff of the Socony-Vacuum, Manufacturing Department, where he will be directly associated with Mr. J. H. Romer."

Latest Car Manufacturers Recommendations*

CHRYSLER IMP. 8 (C23), CUST. IMP. 8 (C24) - 1939—The Fluid Drive which previously has been confined to the C-24 model, is now available also on the C-23 model, as special equipment at extra cost.

Transmission Overdrive, which is standard equipment on the C-24 and optional on the C-23, becomes standard equipment on the C-23 *when the Fluid Drive is used*.

On C-24 and on C-23 models equipped with Fluid Drive, the pedal shaft fitting may be reached from under the hood more easily than from under the car.

DODGE 6 (D11) - 1939 — The model designations for the 1939 Dodge models, formerly known as the Standard and De Luxe, have been changed. The Standard is now known as the Luxury Liner Special and the De Luxe is now known as the Luxury Liner De Luxe.

Highlights of the Hupp Skylark

The Hupp Skylark is the new model put into production by the Hupp Motor Car Corporation the latter part of May. The chassis of this car is very similar in design to the Hupmobile 6, Model E-922, insofar as lubrication is concerned.

A hypoid rear axle is used with a dual ratio hypoid axle available as special equipment. Front and rear spring bolts and shackles are rubber mounted.

Reports from the Field

Most car makers report sales gains over 1938. Figures on new car registrations to the end of April show substantial increases over 1938. New car registrations for April, 1939, were over 40% ahead of April, 1938. Factory production for the second week in May was over 72,000, as compared to over 49,000 for the same week in 1938, according to WARD'S AUTOMOTIVE REPORTS.

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Graham is celebrating its 30th anniversary. The first car, then known as the Paige, was built in 1909.

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Pontiac and Chevrolet are coming out with picture magazines for owners. They are titled respectively "Pontiac Chieftain" and "Friends".

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Studebaker's advertising campaign on the new Champion was scheduled to have a periodical circulation of 29 million copies in May, with radio programs over 77 stations, and displays in 1,000 newspapers.

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The oil industry has splendid exhibits at both the San Francisco and New York expositions.

1939 Buick Oil Filler Cap

The engine oil filler cap on 1939 Buick models has been changed to prevent oil leak at the gasket, also to prevent oil dripping from the filter element due to condensation. The gasket material has been changed to prevent it from taking a permanent set. The tension spring is now being made of spring steel in order to provide a positive uniform tension on the gasket, and the inside tube of the filler cap is filled with copper gauze to collect oil condensation on the inside tube rather than the outside tube.

The above improvements will not only aid in keeping oil off the rocker arm cover, but will also prevent oil from getting on the manifold. When a filler cap leaks badly, the factory recommends that it be replaced by one of the latest type.

CAUTION: Do not squirt oil on manifolds in checking for exhaust leaks, as oil may be drawn up into the choke housing, causing the piston to gum up and make the choke inoperative.

Highlights of the New Crosley Car

The new Crosley car introduced to the public on April 30 is known as the Crosley 390 and is available in two models; a two-passenger convertible coupe and a four-passenger convertible sedan.

One of the seats of the convertible coupe may be removed for added transportation space or converting the car into a ¼ ton commercial vehicle. The car has a wheelbase of 80 in. with a 40 in. tread front and rear. The total length of the car is 120 in. from bumper to bumper. The height of the car is 56 in. and the road clearance is 7½ in. It weighs 920 lb. with full load of fuel and oil.

The car is operated by a two-cylinder-opposed air cooled engine of the light aviation four-cycle type. The engine is cooled by a suction blower cast integral with the flywheel. The engine has a 3 in. bore and a 2¾ in. stroke with a displacement of 38.87 cu. in.

The drive from the engine is directly through the transmission to the rear axle. Universal joints have been eliminated. To compensate for the up and down movement of the rear axle the engine is supported at one point on a specially designed rubber mounting. All spring bolts and shackles are rubber mounted. The tie rod and shock absorber links are likewise rubber mounted and require no lubrication. Outside of such points as the brake cross shaft and the pedal shaft, which are lubricated by spraying, there are only 19 points to lubricate on this car.

(Continued from page 1)

quately equipped for lubrication jobs to properly replenish the shock absorbers on any car equipped with Houdailles, and such replenishment is recommended on every fifth or sixth lubrication job.

In the past, there has been considerable mystery shrouding the operation of shock absorbers in general. This mystery was largely a cloak drawn about the shock absorbers to protect them against careless mechanics. The internal parts of the shock absorber are as finely machined as the internal parts of the automobile engine itself. In addition, the control members in the shock absorber consist of very small orifices and highly polished valve seats which very minute particles of dirt could easily destroy and render ineffective. It is therefore absolutely essential to the continued performance of the shock absorbers that the fluid introduced be scrupulously clean and also conform with the standards as specified by the manufacturer of the shock absorber.

We introduce the latter precaution because the working parts of each individual make and type of shock absorber have been designed to function properly only when filled with an individual and specific fluid.

Some unscrupulous firms have in the past recommended to service station owners that the fluid in shock absorbers needed changing periodically, the same as the oil in the engine crankcase. This is definitely not the case, as it is in the case of the engine. The oil in the engine crankcase needs periodic changing due to the dilution to which it is subjected by virtue of the condensation of water, lighter hydrocarbons and carbon itself. All of these diluents are the result of the combustion in the engine. In the case of the shock absorber there is nothing which can dilute or otherwise destroy the efficiency of the fluid and periodic replenishment to maintain the fluid level at the proper point is all that should be required. Such refilling of instruments, as is recommended by these parties, is fallacious in itself because of the fact that these parties recommend that only the fluid in the reserve of non-working chamber be changed, and by this method the original fluid is left in the working chamber itself. The working chamber constitutes more than 60% of the total volume of the shock absorber so that such refilling amounts to considerably less than half of the total amount of the fluid in the shock absorber. No one would think of changing only half of the oil in the engine crankcase. Following this line of reasoning, why change half of the fluid in these engines?

(Continued on page 4)

The INSTITUTE SPOKESMAN

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George W. Miller . . . *Editor*
498 Winspear Avenue, Buffalo, N. Y.

In Memorium

The many friends of A. J. Stevens will regret to hear of his recent death in Kansas City, Missouri.

"Dad", as he was affectionately known in later years had been in the grease business for over fifty years. As a boy he started working in the plant of the Excelsior Refining Company at Cleveland, Ohio; eventually learning there to make axle grease and No. 3 cup grease, which were the only greases available at that time.

Later Stevens was connected with the Chas. H. Moore Company in Cincinnati and manufactured all the greases which they sold. In 1893 he secured financial backing and started the Stevens Grease & Oil Company of Cleveland. That company was a dominant factor in the grease business for a long period.

Fibrous gear greases, steam jacketed mechanically agitated grease kettles and metal packages for greases are some things which were developed and pioneered by Stevens during that time.

In later years he left Cleveland and organized the A. J. Stevens Grease & Oil Company in Kansas City. It was there aluminum base greases were first made a commercial success under the guiding hand of Stevens.

In 1930 the above company was merged with the Battenfeld Grease & Oil Corporation and "Dad" became a stockholder of the latter company. His knowledge and experience in manufacturing lubricating greases made him a valuable consultant. The fine personality he possessed resulted in numerous business friends who remained loyal, even though Dad was not able to travel extensively in the last few years.

Technical Data

AN OUTLINE OF RESEARCH DEVELOPMENT IN GEAR LUBRICATION TESTING

By C. F. Prutton and A. O. Willey
Consultants, The Lubri-Zol Corporation, Cleveland, Ohio

The testing of oils and gears by the usual and older laboratory methods is apparently being superseded by test methods which aim to duplicate the service conditions of an oil. Thus, rather than measuring viscosity, film strength and the other recognized characteristics of lubricants, it has been found more practical to develop special test apparatus which will, in a comparatively short time, duplicate the service action of automobile gears on the lubricants whose value is being investigated.

Since the advent of the hypoid type of rear end drive, a tremendous volume of research has been conducted along these lines. Several additional tests have been conducted in this laboratory on standard type rear axles where the better grade of lubricants, but not necessarily extreme pressure lubricants, are required. This latter group of tests will be described first.

It was necessary to endeavor to reproduce, in the laboratory, conditions which would be comparable to the operation of an automobile driven at 50 miles an hour for 200 hours or 10,000 miles. This test was considered sufficiently severe to weed out the weaklings. A special loading device was used so that 125% of road torque could be preadjusted on the test equipment and maintained at that loading throughout the period of the test. The laboratory set-up for this test consists of an electric motor driving a rear axle through a pinion. The rear axle drive is transmitted through chain sprockets on the further end of the assembly and the torque resistance of one rear axle to the other is transmitted through a helical spring in the center of the assembly. The method of adjusting this spring will undoubtedly be of interest.

There are two face plates in line with each other which are arranged to be bolted firmly together. Before they are bolted, however, the torque of the spring is arranged by means of a lever arm and weight to be equivalent to a 55 pound-feet torque which for these particular axles represents the 125% road torque mentioned above. When this has been adjusted the face plates are bolted together and the preloading of the test becomes a permanent adjustment.

The axles are standard Ford axles and a test routine has been developed along the following lines: New axles are run in at a low speed of 90 to 100 r.p.m. for ten minutes and then brought up to test speed. This is done without any loading on the torque spring. Level plugs are removed and the filled housings are allowed to drain down to the level of the plug opening. After adjusting the 55 pound-feet torque, the equipment is then brought up to test speed which is equivalent to the 50-miles-an-hour road speed. The first 20 hours are run with fans blowing cool air on the housings. The fans are then turned off and the load checked. Checking is again done at the end of 100 hours. Under these conditions the running temperature of the axle lubricant is in the neighborhood of 195° to 210° F. At the end of the test the lubricant is drained—while hot — and subjected to the usual chemical and physical tests. Clearance measurements are taken and the housings further dissembled for complete inspection. Discoloration, deposits, surfaces of bearings and gear tooth faces are all carefully observed and noted. The evaluation of the quality of the lubricant and its ability to do a job is made from the combined results of these inspections and analyses. In addition, the temperatures obtained during operation and the condition of the lubricant at the end of the test are recorded. This method has the advantage of being able to correlate the physical and chemical analyses of the oil with the "in use" results.

When testing hypoid lubricants the problem here is perhaps not exactly paralleled by other laboratories, since this laboratory was engaged in developing a new hypoid lubricant of a radically different characteristic and type from those previously available on the market. Readers of this publication are undoubtedly familiar with the Gleason "four-square" test and various modifications of this procedure which have been used widely in analyzing hypoid lubricants. Others may be equally familiar with the proving ground tests which have been employed by General Motors and Packard. The employment of laboratory shock load tests has been rather more limited.

The interest here centered in discovering the facts about a particular lubricant when loaded somewhere between the limits of no load and the optimum at which deformation of the mechanical parts would take place. Between these two limits are two or three important load points which must be carefully considered in conducting the tests.

Editor's Note: This interesting and instructive article will be continued in the July issue.

(Continued from page 2)

To sum up, the maintenance of shock absorbers is as vital and profitable as the maintenance of the oil level in the engine crankcase.

The owner's investment is protected at a profit to the service man. Thus it becomes doubly important to make sure the shock absorbers are operating at full efficiency at all times.

In order to further aid the service man in maintaining the high operating efficiency of Houdaille shock absorbers the following specific instructions pertaining to adjustment of the valve mechanism should be rigidly followed.

Ford, Mercury, Lincoln Zephyr, Studebaker (front only)

The reservoir should be filled to just below the bottom of the filler plug hole.

The adjusting pointer is set at the factory to meet the demands for average driving conditions. This position is indicated by a line stamped on the end of the shaft between the shoulder stops. The resistance of the shock absorber can be adjusted by turning the pointer betwen the two shoulders. Turning the pointer clockwise increases the resistance until, when it contacts the shoulder, the valve is shut. When the pointer is turned counterclockwise the resistance is reduced until the pointer contacts the shoulder when the valve is fully open. A slight movement of the pointer produces considerable change in the resistance and therefore it should not be moved more than $\frac{1}{16}$ in. to $\frac{1}{8}$ in. at a time. The shock absorbers on the Ford, Mercury, and Lincoln Zephyr models are equipped with adjustable packing gland nuts. Tighten these nuts each time you refill the shock absorbers.

Lincoln V-12, Studebaker (rear)

The reservoir should be filled to just below the bottom of the filler plug hole.

The valve is set for average driving conditions but can be adjusted to meet some special requirement. To make an adjustment, remove the valve cap nut from the end of the shaft. This will expose the adjusting valve head and the letters indicating the position of the valve. The head of the adjusting screw has two slots. The deep slot with the arrowed indicator is used to stake the valve to the shaft through the means of a small shim inserted in the slot. The wide slot is the one that should be used for making an adjustment. Unless the shock absorber has already been adjusted the arrow will point directly at the line stamped between the letters "O" and "S".